

APPENDIX 5.1.2

PRINCIPLES FOR THE CHARGES RELATED TO THE USE OF ELECTRIC TRACTION

The purpose of this Appendix is to describe the method and rules for drawing up the scales for the following charges, related to the use of electric traction by trains running on the national rail network:

	Charge status	Costs covered	Network Statement Appendix in which the scale appears
RCE (charge for use of electric traction facilities) ¹	Minimum service	Use of electric traction facilities (in particular the maintenance and renewal of the catenary system)	Appendix 5.2
RCTE-component A (charge for transmission and distribution of electric power)	Minimum service	Losses suffered by the electrical systems from substations up to train capture points	Appendix 5.2
RCTE-component B (charge for transmission and distribution of electric power)	Ancillary service	Transmission and distribution of traction power over the electricity networks and associated expenses	Appendix 5.4
RFE (charge for supply of traction current)	Additional unregulated service	Supply of traction current	Appendix 5.4

1. REGULATORY FRAMEWORK AND CHARGING PRINCIPLES

Directive 2012/34/EU² (Appendix II), which defines the services to be provided to railway undertakings by infrastructure managers, is transposed into French law by Decree No. 2003-194 of 7 March 2003. This was amended by Decree No. 2015-1040 of 20 August 2015, in particular to revise the legal framework applicable to the electricity transmission and distribution service.

Therefore, on the one hand, point I of Article 3 of the French Decree No. 2003-194 on **minimum services**, stipulates that the infrastructure manager shall “*provide [...] with use of the rail system for supplying electrical power for traction current [which corresponds to the **RCE** at SNCF Réseau] in addition to covering electrical systems losses from the substations to the train capture points [which corresponds to the **RCTE-component A** at SNCF Réseau]*”. In this respect and without possible prejudice to the future introduction of mark-ups particularly intended to cover all or part of the fixed costs linked to the electrical facilities, the charges perceived for supplying these services are “*equal to the cost that is directly incurred as a result of operating the train service*” (Article 30 of French Decree 2003-194).

On the other hand, paragraph VI of Article 3 of the aforementioned Decree stipulates that “*the use of the electrical railway system for traction current stipulated in paragraph I shall also give rise to the payment by the railway undertaking to the infrastructure manager of the transmission and distribution costs paid by the latter to the electricity transmission or distribution network operators.*” This service, qualified as an “**ancillary service**” in the Network Statement, corresponds to the **RCTE-component B**

¹ The charge for the use of electric traction facilities (RCE) currently covers marginal costs for maintenance and renewal of the electric facilities and is based on the SNCF Réseau costs model. It is calculated as per the method described in Appendix 6.1.1 on the charging principles for the minimum services.

² Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area.

and “gives rise to re-invoicing to the nearest euro by the infrastructure manager of these costs, increased by other expenses incurred”.

Finally, under the **additional services** described in paragraph V of Article 3 of the aforementioned Decree, SNCF Réseau also proposes the supply of traction current, charged under the **RFE**. Given that SNCF Réseau is not the sole provider of this service, this additional service is **not regulated** by the provisions of the French Decree No. 2012-70.

2. RCTE-COMPONENT A

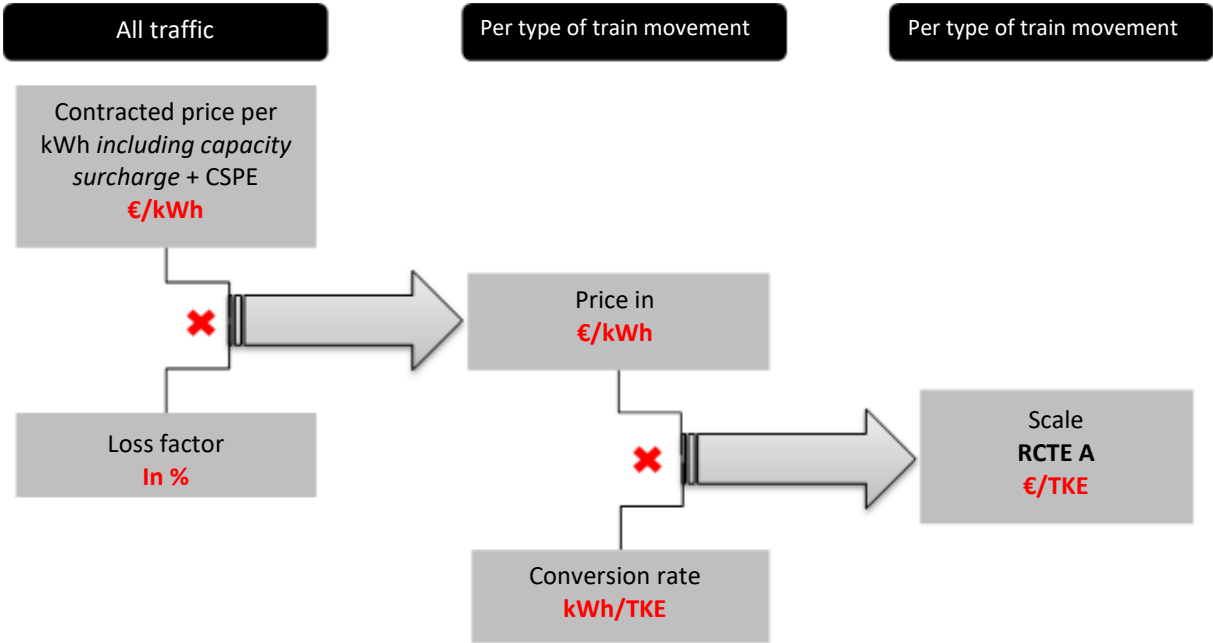
The RCTE-component A is designed to cover the charges incurred by the electrical system losses from the substations to the train capture point, which include the CSPE tax (see §2.2) applied to each unit consumed.

The losses more specifically correspond to the losses suffered by the substations, catenary system, transformation facilities and as a result of the return of traction current. In practice, for each unit of electricity consumed, a part of this is lost over the rail network. This phenomenon, known as the Joule effect (for a part of the facilities concerned), is inherent to electrical physics.

2.1. Principles for calculating the RCTE-component A

The RCTE-component A rate is calculated by a marginalistic approach that consists of applying the loss factor to the price of the power purchased by SNCF Réseau to cover the need linked to the electrical losses. Therefore, SNCF Réseau makes users directly pay for the losses caused by the consumption of their traffic, after applying the conversion rate between the unit consumed in kWh and the unit specific to electric traffic in electric train-km.

The RCTE-component A is determined as follows:



2.2. Charges included in the RCTE-component A

- **Loss factor**

Two methods are currently used by SNCF Réseau to estimate losses:

- the method based on performing a simulation using the ESMERALDA software, involving modelling fifteen lines representative of the network and calculating the loss factor from the difference between the powers debited by the substations and the powers absorbed by the trains;
- the electrical profile method, which considers the loss factor to be the ratio of the power available to the pantographs to the power at the substation, on the basis of electrical profiles determined for each electrified line and section of the national rail network. These electrical profiles characterise the voltage levels on the lines that result from the characteristics of the fixed installations for electric traction systems.

Given that the level of losses differs according to the electrical performance of the network (size of the catenary lines, number of substations forming the line, etc.), the two methods are used for each of the 3 types of existing power networks (1,500 V, 25,000 V and 2*25,000 V).

A comparison between the results obtained by simulation and those obtained using the electrical profile method shows a difference in the mean loss factor obtained of less than 1% between the 2 entirely different methods.

SNCF Réseau has applied an overall network loss factor of 8.5 %.

- **Electricity purchase price**

In response to a request from ARAFER, but also to follow developments in the price of electricity as closely as possible, SNCF Réseau adapted its purchasing strategy by using different purchase dates spread over a 12-month period preceding supply.

For each period and with the purchase volume fixed for this period, SNCF Réseau enters into a contract with a supplier setting a fixed purchase price per megawatt-hour of electricity determined according to the principle below.

Firstly, a call for tenders is used to select the possible suppliers based on technical criteria; secondly, then those selected are placed in competition through a request issued by SNCF Réseau for a tender covering all of its needs fixed for this period.

This purchase price, which corresponds to the average purchase price calculated over all the purchase periods, is that taken into account to calculate the rate of the RCTE-component A, as described above, as well as to calculate the RFE (see § 4).

For 2021-2023 period, the charging for the RCTE A corresponds to the price set for the year 2021 (published in December 2020), which may be adjusted, if appropriate, in December Y-1, of the contractual price for year Y with the SNCF Réseau supplier, depending, on the one hand, on the market prices for electricity and the permitted by the ARENH mechanism to SNCF Réseau and, on the other, on the adjustment of the cost of the capacity mechanism. These adjustments will be made to the customer's invoice, as soon as SNCF Réseau becomes aware of the date of implementation of the changes.

In view of the foregoing, the electricity purchase price is known in November 2021 for the supply of electricity during the 2022 calendar year. The RCTE A price scale is therefore set on publication of the 2022 Network Statement in December 2021.

- **Capacity mechanism**

Since 01 January 2017, in application of a ministerial order of 29 November 2016, the price per megawatt-hour must include the costs incurred as a result of the capacity mechanism, laid down by

the French Decree No. 2012-1445. The purpose of this regulatory provision is to guarantee the security of the French electrical system. The principle of the capacity mechanism is founded on the obligation, for all electricity suppliers, to cover, by way of capacity guarantees, its customers' consumption during electricity consumption peaks. In practice, the application of this mechanism results in higher production costs for the energy provider, which are then passed on to the end customer.

Given that the capacity cost depends on the actual consumption of the customer and on the selection of the peak period by the RTE electricity transmission network operator, it can only be determined *ex post*, at the end of the delivery year. Therefore, the additional cost incorporated by the energy provider at the time of entering into the contract only corresponds to an estimate; the RCTE-component A rate may therefore be subsequently adjusted, the conditions for which are explained below.

- **CSPE tax**

The CSPE mechanism (or contribution to the public electricity service) was incorporated into the inland tax scheme on the final electricity consumption (TICFE) on 01 January 2016. The tax rate is annually reviewed by the Energy Regulation Commission (CRE).

However, for persons engaged in the transport of persons and goods by train, metro, tramway, cable and trolleybus, the rate of the tax applicable to final electricity consumption, a specific rate is applied, in accordance with the provisions of C of 8 of Article 266d C of the Customs Code.

2.3. Cost allocation base for invoicing the RCTE-component A

SNCF Réseau has selected the electric train-kilometre, representative of electric convoy traffic, as a billing unit of the RCTE-component A. In order to express the scale of the RCTE-component A in this unit of work, kilowatt hour conversion rates / electric train-kilometres are used. The conversion rates applied, which produce a different scale depending on the homogeneous traffic types, are provided in the table below:

Type of train	kWh/electric train-kilometre conversion rate
Regional, national and international passenger trains suitable for high speeds	24.50
Other national and international passenger trains	15.80
Regional passenger trains (other than those in Greater Paris (Transilien)) not suitable for high speeds,	13.50
Transilien regional passenger trains not suitable for high speeds	23.80
Freight trains	17.92
Other trains (light running, rolling stock, etc.)	9.10

2.4. RCTE-component A payment method

In addition to any price adjustments indicated in § 2.1, the RCTE-component A is subject to the following payment method.

The price of the power stipulated in the contract taken out by SNCF Réseau may be revised as a result of the capacity mechanism. By way of example, lower consumption levels (with regard to the estimates) during a peak period will result in reduced charges with the supplier. Conversely, overconsumption will result in an increase to these charges.

Therefore, SNCF Réseau shall apply the following adjustment mechanism:

- i) for the year Y, the rate for the RCTE-component A includes the additional cost generated by the capacity mechanism as known at the date of creation of the scale of charges;
- ii) as soon as the final adjustment has been made to the capacity mechanism (during the calendar year Y+1) by the electricity provider (reductions or increases), SNCF Réseau shall make adjustments at the same proportions with its customers;
- iii) the customers are informed and receive an adjusted invoice, calculated according to the difference between the rate displayed in the Network Statement and the rate that includes the final additional cost of the capacity mechanism.

Moreover, SNCF Réseau reserves the right to adjust the RCTE-component A if either of the following two cases should arise:

- change of the kWh/electric train-kilometre conversion rates as defined above, following studies and analyses performed in coordination with the railway undertakings concerned;
- capping of the volume obtained within the framework of the ARENH, leading to a modification of the contractual rate.

Customers shall be informed should this apply.

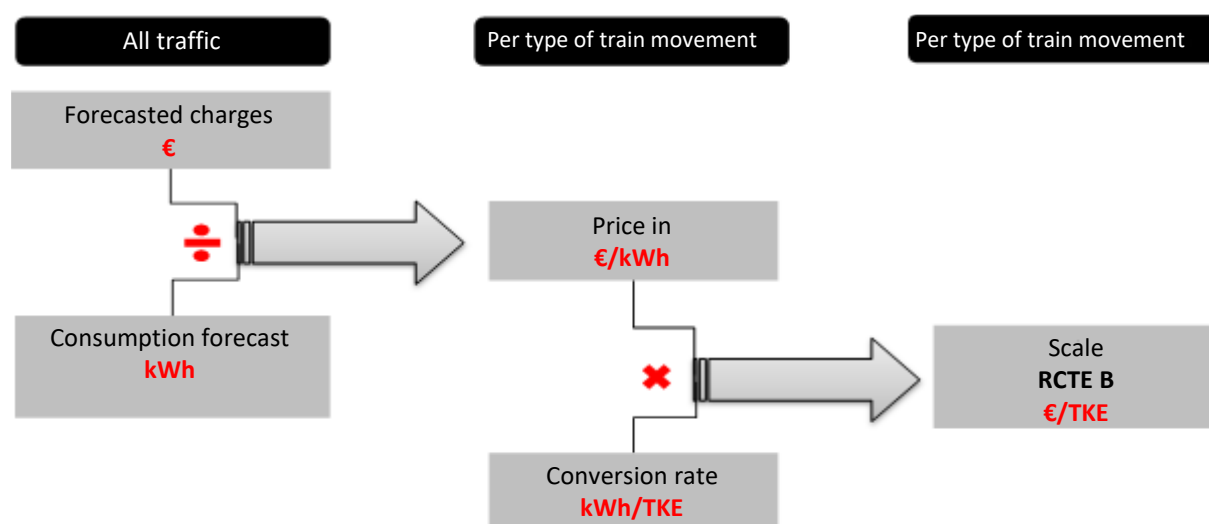
3. RCTE-COMPONENT B

The purpose of the RCTE-component B is, on the one hand to cover the charges specific to power transmission (transmission and distribution of electricity by the electricity networks as far as the substations of the national rail network), and on the other hand to cover the ancillary fees incurred.

3.1. Principles for calculating the RCTE-component B

The rate for the RCTE-component B corresponds to the estimated charges base described below, correlated with the forecast volume of consumption. The forecast volume of consumption is drawn up according to the consumption recorded for the period between October Y-2 and September Y-1.

The RCTE-component B is determined as follows:



3.2. Charges included in the RCTE-component B

The charges base breaks down into electricity transmission charges (for close to 98%), traction energy metering management charges on the RFN, based on the consumption data issued from the meters installed both in the RFN substations and onboard the traction engines, along with ancillary fees.

- **Transmission charges**

The electricity transmission charges (electricity transmission network access contract (CART) and electricity distribution network access contract (CARD)) correspond to the actual charges incurred by SNCF Réseau between October Y-2 and September Y-1, to which may be applied adjustment factors designed to take into account the revaluation of the public electricity network usage rate (TURPE)³. These adjustment factors are set by the Energy Regulation Commission (CRE) and are applicable from the 1st of August of each year.

- **Traction energy metering management charges**

SNCF Réseau uses specific tools to consolidate the energy consumption data for electrical traction. This consumption data is issued both by meters installed in the substations as well as meters placed onboard the traction engines. They supply the SATURNE tool for the substations, **SOCLE** (Electrical Localisation and Metering OS) to remotely read the on-board meters under the 2012 standard on electrically-powered trains running within and outside of the national rail network⁴ and **ORES** (Estimate Consolidation Tool) which enables the traffic to be consolidated with the actual consumption to supply the tool estimate models in order to estimate the consumption of the traffic for which the trains are not equipped with meters. The charges generated by these information systems mainly correspond to the costs for maintaining the system in operational condition and IT development costs. These charges break down as follows:

- costs incurred by the operators in charge of managing the electrical hook-up contracts for the substations;
- costs incurred by the business line operators assigned to managing the metering data from the substations and traction engines;
- maintenance cost for the SATURNE (remote reading of substations meters), SOCLE (onboard meter remote reading) and ORES (train movements log) tools to maintain these in working and development conditions.

- **Ancillary fees**

The other ancillary fees can be broken down into the following:

- staff costs for staff allocated to managing the power supply system;
- fees for managing metering data derived from the substations and motored vehicles (maintenance costs and specialised operator costs);
- financial costs (expenses resulting from cash advances);
- costs of drawing up consumption forecasts;
- procurement assistance fees which represent the fees for consulting, training and support services provided to purchasers and experts of SNCF Réseau.

3.3. Cost allocation base for invoicing the RCTE-component B

³The public electricity network usage rate (TURPE), which is used to pay electricity transmission and distribution network operators (ENEDIS, ELD and RTE). The TURPE's formula is revised approximately every 4 years with annual revaluation of the prices on the 1st of August according to a calculation drawn up by the Energy Regulation Commission (CRE) to take into account inflation and the evolution of the actual charges incurred by RTE and ENEDIS. TURPE 6 (HVB & HVA/LV) is in force since 2021, replacing TURPE 5.

⁴The consumption levels recorded on other networks (in particular foreign networks) are not taken into account by SNCF Réseau.

In the same way as for RCTE-component A, SNCF Réseau has selected the electric train-kilometre as a billing unit of the RCTE-component B. In order to express the scale of the RCTE-component B in this unit of work, kilowatt hour conversion rates / electric train-kilometres are used. These conversion rates, which differentiate between the scale of charges per type of traffic, are those stipulated in § 2.3.

3.4. RCTE-component B payment method

In accordance with the provisions of the French Decree No. 2003-194, the RCTE-component B “*gives rise to re-invoicing to the nearest euro by the infrastructure manager of these costs*”.

Therefore, if the evolution of the charges for energy transmission and distribution deviates from the selected forecasts, SNCF Réseau shall apply an adjustment process that affects its customers. Where relevant, the customers will be informed and will receive an adjusted invoice during the 1st quarter Y+1 for the year Y.

Moreover, these rates may be revised if the kWh/electric tr-km conversion rates used to produce the charging rates are revised after studies and analyses conducted in conjunction with the railway undertakings concerned.

It should also be noted that after any adjustment is made by Réseau de Transport d'Electricité (RTE, the power transmission network manager), according to the rules in effect for RTE at the date of publication of this Network Statement, twelve months at the latest after the end of the financial year, the amount of the RCTE-component B may be subject to further adjustment at the beginning of year Y+1.

Customers shall be informed should this apply.

4. RFE

The rate for the RFE is based on the electricity price that SNCF Réseau has agreed to pay through the contract with its supplier(s), which includes the CSPE applied to each unit consumed, the cost of the capacity mechanism (see § 2.2), the management fees (financial fees and staff costs for staff involved in the process), the proportionate share of the fees incurred to draw up the consumption forecasts, and the proportionate share of the electricity procurement support fees.

3.5. Cost allocation bases for invoicing the RFE

The rate of the RFE is expressed either in MWh or in electric train-kilometres, depending on whether the trains of the railway undertakings are equipped with an electricity meter:

- The RFE rate in MWh is applicable to all electric traction units (including rented engines) fitted with a meter that can be remotely read by SOCLE until the end of April 2022 then DECOFER, and potentially, for engines that continue to operate cross-border, with another remote-reading device that communicates with SOCLE. In order for the rate in MWh to be applied, the railway undertaking must specifically meet the following conditions:
 - (i) carry out and guarantee the correct configuration in the DECOFER portal of all equipped electric traction units (including rented traction units) in order to ensure that the remote reading of information and consumption is performed correctly;
 - (ii) allow SNCF Réseau and RTE to check all of the fleet's equipment at any time;
 - (iii) declare, in the event that no communication link is established between the boxes and the remote reading platform, all train movements operated using SOCLE and possibly, for engines that continue to operate cross-border, another remote-reading application that communicates with SOCLE

- The RFE rate per electric train-kilometre is applicable to all of the electric traction units (including rented locomotives) that are not fitted with a meter that can be remotely read. This rate is different for each type of traffic. The kilowatt-hour/electric train-kilometre conversion rates are those stipulated in § 2.3.

3.6. RFE payment method

The payment principle applied to the RCTE-component A within the scope of the capacity mechanism (see § 2.4) is also valid for the RFE.

Moreover, the rates can be reviewed if one or more of the following cases arise:

- change of the kWh/electric train-kilometre conversion rates as defined in § 2.3, following studies and analyses performed in coordination with the railway undertakings concerned;
- capping of the volume obtained within the framework of the ARENH, leading to a modification of the contractual rate.

Customers shall be informed should this apply.